N.A.C.A. BULLETIN

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EDITORIAL DEPARTMENT NOTE

The past several years have seen an increasing number of presentations providing instances of budgetary control in which the procedures recommended were closely linked to operating facts. The first article in this issue, dealing with the machine tool industry in which short-run plans are perhaps less easily tied to certainties than in many other lines, affords another example of control methods aligned to market outlook and shop conditions.

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A general conviction exists among accountants and line executives that it will ultimately prove possible to exercise a control over the costs of selling and distributing products comparable to that which has been developed in many companies to control manufacturing costs. Our second article takes hold of this thought and makes considerable headway in presenting the control of costs of distribution as amenable to systematic survey.

The author, FRED L. HEATH, is a consulting engineer in the field of sales, distribution, and production problems and is President of the engineering firm bearing his name. Mr. Heath is a veteran of World War I. After a period in sales work, he entered the industrial engineering field in 1928 with a large eastern firm, later becoming its Executive Vice President.

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Are your customers going to repair or replace? In companies manufacturing large items of equipment, it makes a difference. The only authoritative answer lies with events, but a procedure for following items beyond the point of sale which may provide pertinent information on the subject is outlined in the third article.

The presentation is written by RUSSELL I. JOHNSON, Tabulating Supervisor, Caterpillar Tractor Co., Peoria, Ill. Mr. Johnson has occupied this position for the past two years and previously held planning, cost, auditing, and payroll posts with his company.

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Control of labor costs is a current problem which takes precedence of all others in the thoughts of many operating executives in manufacturing companies. As a result, a number of useful devices for prompt reporting of labor costs incurred are being employed to make such control effective. Almost all, like the one set forth in our final article, will give direction to the thinking of industrial accountants in other lines and companies coping with the same broad problem.

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APRIL 1, 1948

BUDGETARY CONTROL OF PRODUCTION AND COSTS IN THE MACHINE TOOL INDUSTRY

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THE Machine tool manufacturer in the United States faces many vital problems today. He is confronted with a saturation of his domestic market as a result of peak production during the war years. He realizes that because of chaotic postwar economic conditions abroad, his foreign market is seriously jeopardized. He is apprehensive about the level of domestic industrial activity because of ever increasing prices. He is probably in the position of having, during the war, expanded his plant far above the capacity required for normal peacetime production of his basic products. He must make plans to provide funds to replace, sometime in the future, heavy and costly items of machinery and equipment at prices which may be far in excess of the cost of his present equipment.

Need For and Purpose of Budgetary Control

How then shall he cope with the many and varied problems with which he is confronted? It is true he must have a creative research organization capable of producing new machines and equipment, or improving existing ones, at a rate sufficient to maintain or improve the competitive position of his company, a skillful and efficient shop organization for producing his goods, and a distribution or sales organization for securing a reasonable share of the potential market for his tools. But such an organization does not guarantee a fair return for his stockholders, nor will it, in and of itself, insure against financial failure of the business. Therefore, the importance of an effective system of budgetary control as a function of his administrative or accounting staff cannot be overemphasized.

The purposes and advantages of business budgeting in the machine tool industry at the present time may be briefly outlined as follows:

1. It will enable the management to investigate thoroughly and to study the situation with which the enterprise is faced.

2. It will provide the means for arriving at an expected or probable maximum volume of business obtainable for a given period of time in the future.
3. It will enable the manufacturer to set a profit objective, based upon the expected volume of business.
4. It will provide a means of relating the activity of the business to the level necessary to produce the expected sales volume and to realize the profit objective.
5. It will afford a means of controlling operations during the period required to reach the objective.

Approach: The Sales Budget

The most important single element in budgetary control is a sound and accurate sales forecast.

The following factors might be pertinent and should be given due consideration in reconciling past performance sales with results of market or sales analysis:

1. The expected general trend of industrial activity and business volume.
2. The sales curve in the immediate past as a possible indication of a continuing trend.
3. The potential sales stimulus of the 1947 National Machine Tool Builders' Show.
4. The effect of peak production during the war years and of the supply of available war asset machines on the market.
5. The recovery or loss of a portion of the company's potential market for competitive machines.
6. The effect of the "dollar shortage" on foreign sales of machines.
7. The possible effect on foreign sales of the Marshall Plan, with its avowed secondary purpose of furnishing agricultural and industrial machinery with which to rehabilitate war-torn nations.
8. Technological improvements causing a change in the market for the manufacturer's particular products or requiring changes in customers' methods of production or products to be produced.

Setting the Profit Objective

Having projected sales into a fixed period in the future, it is

then necessary for the manufacturer to set a profit or financial objective based upon and for the period contemplated in the sales forecast. In setting the profit objective, it will be necessary for him to consider many interlocking factors, such as the following:

1. The profit or loss which will result from a given volume of sales.
2. The break-even point in sales.
3. The required volume of sales necessary to produce a given profit essential to retain capital in the business.
4. The sales which can be produced with the available plant facilities and the capacity at which it is necessary to operate the plant in order to break even or to produce a given profit.

Having arrived at an expected sales volume for the subsequent fiscal year, it is a fairly simple matter to determine, *on the basis of present operations,* the relationships outlined above. For example, assume that the manufacturer has arrived at a sound sales forecast of $6,000,000 for the ensuing fiscal year, that his present fixed costs amount to $2,000,000 a year, and that his variable research, engineering, manufacturing, selling, and administrative costs are 70 per cent of sales. Assume also that each direct labor hour is currently producing $10 in sales and that available plant capacity on a one-shift basis is capable of utilizing 1,000,000 direct labor hours a year. These figures would tabulate to the following results:

Level	*Sales*	*Costs**	*Profit (Loss)*	*Direct labor hours***	*Per cent of one-shift operation*
Forecast	$6,000,000	$6,200,000	($200,000)	600,000	60%
Break-even	6,666,666	6,666,666	—	666,666	66⅔%
Profit area	8,333,333	7,833,330	500,000	833,333	83⅓%

* $2,000,000 plus 70% of sales
** Computed as one for each $10 of sales

The figure for sales required for any level of profits to which all aspects of the data apply is obtainable by dividing 30%, the margin between variable costs and sales, into fixed costs of $2,000,000 plus the profit sought.

It will be apparent that the figures we have been working with are those underlying the familiar break-even chart from which similar correlated data for graduated levels of activity may be read by inspection.

Steps Toward Realizing Planned Profit

Faced with the situation which we have outlined the machine tool manufacturer, in setting his profit objective, has several alternatives. He may take steps to increase his sales volume. He may increase his unit selling prices if competitive market conditions permit. On the cost side, he must decide to what extent variable research, engineering, manufacturing, and selling and administrative costs must be reduced in order to realize the profit objective set. It is in connection with the latter step that budgetary and production control become most important.

The machine tool manufacturer has many involved considerations in the control of production. He may have as many as 30,000 different components of finished parts, merchandise, equipment, and special tools assembled into his finished products. He manufactures and purchases standard or semistandard parts and equipment for stock in anticipation of sales demand for his basic machines, but he must engineer and manufacture many items of special equipment and special tools to his customers' specifications upon receipt of orders, to be shipped and used with his basic machine. Because of the inherent nature of his product, he has a lengthy production cycle.

Production Required by Sales Forecast

The first steps in control of production are those of expressing the sales forecast in terms of physical components or units and in terms of plant load. The following method was recently used by a machine tool manufacturer, which, in one operation or analysis, provided all of the necessary information as to physical components or units required to be produced in order to fill the sales forecast.

The manufacturer has four basic major product classifications with several sizes of machines or equipment in each classification and an aggregate of approximately 25,000 different component finished parts. Costs and accounts are kept on the basis of standard cost and inventories are so valued for financial statement purposes. The manufacturer has a master engineering file of machine tabulating cards for each component finished part included in its basic finished products, and each tabulating card has punched therein the part number, the inventory classification, and the standard cost of the finished part. Plant operations currently are on

a one-shift basis at 100 per cent of capacity plus a second shift at approximately 15 per cent of capacity. A sound sales forecast has been developed for the ensuing fiscal year.

Duplicate tabulating cards for each part (with the part number, inventory classification, and standard cost indicated and punched therein) were reproduced by the machine duplicator and were distributed, together with a copy of the detailed sales forecast, to the ordering and inventory control clerks. The clerks selected were those: (1) who were qualified to interpret the sales forecast in terms of component parts and equipment, and (2) who were responsible for setting *proper* maximum, minimum, and production order quantities.

The ordering clerks then reviewed each finished parts perpetual inventory card and, in the light of the requirements necessary to fill the sales forecast, entered the following information on the duplicate machine tabulating cards for each finished part:

1. The quantity in finished parts stock.
2. The quantity on order and in process.
3. The quantity to be manufactured in the first quarter of the ensuing fiscal year.
4. The quantity to be manufactured in the second quarter of the ensuing fiscal year.
5. The quantity to be manufactured in the last half of the ensuing fiscal year.

The tabulating cards were then returned to the tabulating department, the foregoing information punched therein, and all of the quantities shown were extended (by means of the automatic machine multiplier) at standard cost. A detailed tabulation and a summary tabulation were then made, the latter appearing somewhat as follows:

			Standard Cost		
			To be manufactured in 1948		
Machine classification	*In stock*	*In process and on order*	*First quarter*	*Second quarter*	*Last half*
A	$171,648	$308,496	$175,231	$160,418	$305,345
B	97,741	187,765	90,012	88,419	160,425
C	74,412	138,138	84,177	71,683	142,021
D	47,360	106,290	46,465	47,893	102,314
Totals	$391,161	$740,689	$395,885	$368,413	$710,105

Conversion to Plant Load

The foregoing summary was then converted into plant load figures as illustrated in Exhibit 2. It should be noted that the above inventory analysis was prepared as of the end of the tenth month of the fiscal year preceding the forecast year. In order to arrive at direct labor hours necessary to *complete* the material "In process and on order," it was necessary, therefore, to reduce the total standard cost thereof by the amount already expended, as indicated by the total value of the work in process inventory as of the same date, stated at standard cost.

It should be noted further in connection with the computations in Exhibit 2, that important factors in arriving at accurate manufacturing load figures are the conversion rates used to get from standard cost to sales dollars to direct labor hours. The key factor in arriving at the rate of sales dollars to be produced per direct labor hour, or in adjusting a rate based upon experience, is the lot size of the production order. Obviously, a reduction in order lot sizes to conform to the projected sales will increase the ratio of setup to machine or productive time and correspondingly decrease the number of sales dollars produced per direct labor hour.

The "balance to be manufactured," stated in sales dollars in Exhibit 2, was computed merely as a step in converting the standard cost of material to be manufactured to the number of direct labor hours required for such manufacture. However, it served, when compared with the total projected sales for 1948, as an indication of the extent to which projected sales could be satisfied from current inventories of finished parts.

From the computations developed in Exhibit 2, it was possible to draw the following general conclusions:

1. That the excess sales backlog on the manufacturer's books at October 31, 1947, would be eliminated at the end of 1947, if the present rate of operation continued until that time.
2. That a drastic reduction in plant personnel would be likely to be required as of January 1, 1948.
3. That substantial savings could be effected as of January 1, 1948, by completely eliminating the second shift operation with its disproportionate overhead supervision and night shift premium costs.

A. B. C. COMPANY

Computation of Estimated Plant Load in Direct Labor Hours for the Year 1948 Based Upon 1948 Sales Forecast and Inventory Analysis as of October 31, 1947

	On order and in process at Oct. 31, 1947	*To be manufactured—1948*		
		First quarter	*Second quarter*	*Last half*
Total amounts, at standard cost, to be produced, per inventory analysis as of Oct. 31, 1947...	$740,689	$395,885	$368,413	$710,105
Less:				
Work in process inventory per books, at Oct. 31, 1947, at standard cost	405,192	—	—	—
Balance to be manufactured from Oct. 31, 1947, to Dec. 31, 1948, at standard cost.....	$335,497	$395,885	$368,413	$710,105
Balance to be manufactured from Oct. 31, 1947, Dec. 31, 1948, in sales dollars (ratio of standard cost to sales —40%)	$838,742	$989,712	$921,032	$1,775,262
Total direct labor hours required (rate $11)..	76,249	89,974*	83,730*	161,387*
Direct labor hours required per week	9,531	6,921	6,441	6,207
Plant capacity in direct labor hours per week at Oct. 31, 1947:				
First shift	8,261	8,261	8,261	8,261
Second shift	1,239	1,239	1,239	1,239
Total	9,500	9,500	9,500	9,500
Per cent of plant capacity to produce projected sales:				
Oct. 31, 1947, basis.	100%	73%	68%	65%
One-shift basis ...	115%	84%	78%	75%

* Total direct labor hours required in 1948—335,068.

EXHIBIT 2

4. That no costly overtime operation would be necessary after January 1, 1948.
5. That, in fact, it would be possible to handle some subcontract or "filler" business in 1948, in order to absorb idle plant capacity ranging, on a one-shift basis, from 16 per cent in the first quarter of the year to 25 per cent in the last six months of the year.

The manufacturer had thus arrived at the basic information necessary to develop a production program for the ensuing fiscal year, which clearly defined a level of plant operation necessary to produce a given volume of projected sales.

Budgeting Manufacturing Expense

The next step was to translate the production program into estimated costs in order to effect financial coordination toward the profit objective. It was the opinion of the management that direct labor costs were being adequately controlled by means of a wage incentive plan covering direct labor operations. It was also felt that a high degree of control of material costs had already been obtained by the application of rigid engineering standards governing the use of raw materials, and by a provision in the wage incentive plan providing penalties for excessive scrap or spoilage in the manufacturing processes. The greater benefits would, therefore, accrue from the application of strict budgetary control to manufacturing overhead costs.

A tabulation was made of the variable, semivariable, and fixed manufacturing overhead costs as shown in Exhibit 3. Column 1 of Exhibit 3 represents the actual costs incurred in a recent twelve months' period during which 494,000 direct labor hours were expended. Column 2 represents the amount of reduction in variable costs which could be effected merely on the basis of the reduction in volume. These figures were computed solely to reflect percentage reduction from direct labor hours expended in the recent twelve months' period (494,000) to the direct labor hours (335,068) required in the ensuing fiscal year to produce the projected amount of sales (See Exhibit 2).

Column 3 represents the amount of any further reductions considered possible. The amounts reflected therein were based upon a detailed study of each cost involved and included: (1) a reduction (in addition to the percentage volume reduction) con-

A. B. C. COMPANY

Manufacturing Expense Budget

Year 1948

Account	(*Column 1*) *Costs for 12 months ended Oct. 31, 1947*	(*Column 2*) *Volume reduction (32%)*	(*Column 3*) *Reduction per detailed study of manufacturing overhead*	(*Column 4*) *Budgeted cost for 1948*	(*Column 5*) *Budgeted cost per direct labor hour in 1948*
Variable and semivariable expenses:					
Plant management	$ 136,179	$43,577	$ —	$ 92,602	$ .2762
Plant supervision	348,345	155,047	25,000	168,298	.5021
Engineering	53,793	17,214	2,500	34,079	.1016
Research and development	121,456	—	—	121,456	.3623
Training school	6,406	—	500	5,906	.0176
Internal trucking	18,208	5,827	2,400	9,981	.0298
Hand tools	40,281	—	8,500	31,781	.0948
Production tools	89,200	28,544	4,000	56,656	.1691
Repairs	86,465	—	25,000	61,465	.1834
Salvaging	18,576	5,944	—	12,632	.0377
Metallurgy	11,767	3,765	—	8,002	.0239
Group insurance	16,602	5,313	—	11,289	.0337
Compensation and accident insurance	13,268	4,246	—	9,022	.0269
Shop supplies	56,840	18,189	3,500	35,151	.1049
First aid	2,377	—	500	1,877	.0056
Vacation pay	89,501	28,640	—	60,861	.1816
Maintenance	45,577	—	10,000	35,577	.1062
Instruction	13,577	—	12,077	1,500	.0044
Overtime	30,789	—	30,789	—	—
Social security taxes	54,762	17,524	—	37,238	.1111
Power and light	44,867	14,357	5,000	25,510	.0761
Heat	15,718	5,030	2,500	8,188	.0244
Miscellaneous production	67,003	—	12,500	54,503	.1627
Total variable and semivariable expenses	$1,381,557	$353,217	$144,766	$ 883,574	$2.6361
Fixed expenses:					
Fire insurance	$ 5,184	$ —	$ —	$ 5,184	$ 432*
Taxes	55,053	—	—	55,053	4,588*
Depreciation	95,762	—	—	95,762	7,980*
Total fixed expenses	$ 155,999	—	—	$155,999	$13,000*
Total manufacturing expense budget	$1,537,556	$353,217	$144,766	$1,039,573	
Direct labor hours	494,000			335,068	

*Represents monthly dollar cost.

EXHIBIT 3

sidered possible because of the elimination of the second shift with its disproportionate supervision costs and night shift premiums, (2) efficiency savings because of the contemplated application of a job rating and incentive plan to indirect workers, and (3) savings which would be effected by means of rigid budgetary control of costs.

Budgeted costs (column 4) were then computed by deducting columns 2 and 3 from column 1. It should be noted that, in arriving at the amounts included in columns 2 and 3, due consideration was given to the opinions of those shop executives and supervisors who were ultimately to be responsible for controlling costs within the budget program.

Budgeted costs were then converted into terms of cost per direct labor hour (column 5) by dividing budgeted dollar costs by the direct labor hours (335,068) required in the ensuing fiscal year. Although budgeted costs per direct labor hour, so arrived at and regarded as the key factor for control purposes, were based upon a fixed volume of production, they could be adjusted from time to time for changes in volume or other factors by making a recomputation along the same lines as the original computation which Exhibit 3 illustrates.

Control of Operations and Costs

With the availability of the budget information developed, a revision was made in the manufacturing expense schedule included in the monthly operating reports of the manufacturer to provide a comparison of the actual costs incurred with the budgeted costs and the amount of any increases or decreases as compared with budgeted costs. The amounts of budgeted costs used each month were arrived at by multiplying the actual direct labor hours expended in the particular monthly period by the budgeted rate per direct labor hour as developed in column 5 of Exhibit 3.

The accountant or budget director was thus provided with the basic requirements for presenting a budget program to the shop executive responsible for carrying it out, for keeping the shop executive or supervisor informed of progress made, for reporting and placing responsibility for failure to meet the program, for taking remedial action, and thus for controlling shop operations and costs at a level necessary to attain the over-all profit objective.

BASIC STEPS IN DEVELOPING A DISTRIBUTION COST SYSTEM

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THE objective of a distribution cost accounting system must be to improve a company's profit. If it will not do this any new setup will merely represent change for the sake of change. Increase in profits is the one positive objective. If distribution cost accounting is installed merely to reduce distribution costs or hold them in line, the approach is negative. If a company reduces distribution costs in this way and the profits are not increased, the system has served no useful purpose. However, if the system provides information enabling more intelligent direction of effort to produce more truly profitable sales and fewer marginal ones, the approach is positive.

For example, it may well be that a company's profits can be increased by a rise in distribution costs. The training of industrial accountants has been to think in terms of cutting production costs. Cutting costs in distribution may be the very thing some companies should not do. There is no assembly-line inspection to make certain that quality of effort is not cut as well. The probabilities are that it is the destiny of sound accounting control procedures for distribution costs to supply the lack of a comparable appraisal of productive effort by disclosing analytically the result of distribution policies.

On this general question of outlay appropriate to distributing products, it may stimulate the imagination to consider what a wide difference the type of distribution operation will make. A manufacturer may sell exclusively by direct mail effort, advertising, sales staff, or sales agents—or some combination of these—and he may sell to wholesalers, retailers, or consumers. I have in mind a shoe company "selling syndicate" to three customers. Sales expense consisted of a portion of executive salaries. However, since this company was making half a million pairs of shoes each year which were retailing for $2.75 above the company's price for them, distributing expenses and profits of others were consuming $1,375,000 somewhere along the line. In a sense, this figure is cost of distribution of the company's products and change in policy under which it began to sell to a different level of customers would push the profitable distribution costs in the direction of this upward limit.

Opportunity for the Industrial Accountant

Of course, distribution costs should be threshed for the chaff and waste in the same way that costs of production are. In fact, in the remainder of this article the predisposition of the accountant to think of control as simply limitation on outgo is likely to take over again because we shall be talking about product and functional costs of various sorts and the instinctive thought will be "keep it down." That is why I have indicated at the start that my meaning will rather be "keep it profitable."

In substance, what follows will deal with (1) the utility for distribution expense control of the adoption of standard prices understood simply as product costs including allocation of general and commercial overhead as well as planned profit, (2) product and functional cost analyses of various types, and (3) an indication of the sort of "spot" cost accountants will find themselves in when they have the right sort of information to supply to management on the subject of distribution costs. It will be a "tight spot" only in the sense that ignorance is bliss. In all other senses, it will mark a generally improved situation in which distribution costs are given deserved attention and the cost accountant finds a new field of endeavor in implementing management policy.

I believe that the cost accountant has not taken his proper position in industry and that he will not unless he begins to exercise his imagination, to think in terms of profits instead of costs, and to learn to sell and to get his ideas across to his organization. In addition, it seems to me that he can accomplish what he desires most easily if he takes the "bull by the horns" and sells management the following background ideas:

1. Factory costs are only partial costs.
2. Sales, advertising, and other distribution costs are overhead to the same degree and as ripe for control as factory overhead.
3. A proper charge for profit on any product or job is a "cost" not to be impaired by selling prices if it can be helped. Profit should not be something that may be left after all bills are paid.
4. A standard price which would in effect be a total product cost should be developed to keep the profitability of sales in the forefront of attention at all times.

Use and Development of Standard Prices

Today, in standard costs there are ordinarily variance accounts for labor performance, material yield, overhead absorption, and other elements. A standard price would enable management to maintain a variance account to disclose the effect of sales under or over a price developed as a reliable indicator of profitability. A standard price is not a selling price as such, although if the two coincide it may well be a favorable factor in the conduct of operation. Often the sales department may be forced to sell for less due to a competitive condition but the knowledge of what is being done, in terms of standard prices, will stimulate compensatory policies with respect to other products.

The sales department will be able to know the contribution of its efforts and policy decisions to company profits. Sales divisions of some companies now using a standard price procedure set up their own forecast profit and loss statements on the order backlog and present it to management saying, in effect, "Here are profits of the company for December, January, February, etc., if the plant does its job of keeping within standard costs and maintains the shipping program promised." There is no surer way to make a sales organization profit-conscious rather than volume-conscious than by employing standard prices and keeping track of related variances.

In constructing the cost basis of the standard prices for products, it seems to me important to distribution cost accounting that the allocation of administrative and inside sales expense and any other allocations of sales expense that have to be made should be in proportion to labor and overhead, excluding material costs, and that the profit included in the standard price be similarly arrived at. This is the conversion cost principle of pricing and seems to me to be appropriate to the application to products of general and sales overhead and anticipated profit because, under normal conditions in the average company, administrative effort is focused on operations rather than material procurement. In addition, the more labor and overhead that goes into a product the more selling is required, although this contention might bear more explaining not possible here. At all events, it can hardly be questioned that, if a company is selling an engineered product and also a jobbed item, more labor and overhead is expended on the engineered product, more selling ability is required, and more profit taken. A jobber salesman is not comparable to a sales engineer.

Standard price is an extension of standard cost, or whatever costing method is in use, to produce a total cost. This standard price implies allocation to products on a practical basis of all distribution costs and profit expectations. Just as standard costs represent careful predetermination of factory cost, standard prices provide a predetermined total cost with allowable amounts of expenditures properly charged or allocated. They may be used to establish variances either against actual distribution costs or actual sales prices, making for control in both directions.

Analyses of Profitability and Functional Costs

If I were asked to frame a single recommendation which would afford proper direction for setting up a satisfactory system of distribution cost control, it would be to make a list indicative of the purposes for which such a system is to be used. The sequence of distribution processes should probably receive first notice as, in effect, a display of the functions needing control and should be followed by notation of product, territory, and customer, salesman, tonnage factors, etc., as analytical means to control. Thus the first portion of the list might well consist of a step-by-step detail of the processes, applicable to the particular company, involved in distribution. This list might include shipping, warehousing, storage, transportation, advertising, service, recording, collecting, etc. On the basis of these processes, pertinent questions will suggest themselves and will lead to recognition of further purposes which must be realized if the challenge of establishing a distribution cost control system is to be met. Among the things which it would be important to consider, it seems to me, are:

Profitability analysis:
- Classes of products
- Individual products
- Territories
- Principal customers

Comparative sales costs:
- Territories
- Class of business
- Physical units
- Weight

Other relevant costs:
- Fixed handling costs per order
- Cost per salesman's call
- Sales service costs
- Sales office costs
- Discounts paid to jobbers
- Shipping costs—incidence on products and class of business
- Warehousing costs (same aspect)

Advertising costs (effectiveness):
- Direct mail
- Media advertising
- Point of sale advertising
- Field sales promotion

Interpreting the Disclosures

Suppose that one of the analyses developed shows that two-thirds of the company's business is coming from one-third of its sales force or manufacturers' agents! It may easily be found that this relationship, or worse, exists unless there are only one or two salesmen. Perhaps management will begin to study the allocation of territories, the capability or the training of salesmen and their physical effort. Certainly diminishing returns are occurring if two-thirds of an important category of sales cost produces only one-third of the volume. Or it may be that less than ten per cent of the active accounts are found to produce seventy per cent to ninety per cent of this volume. If so, management will begin to question whether or not all customers are good customers.

If it can be shown through tabulation of the frequency of calls that many of the salesmen expend most of their time nursing a few large accounts and very little time bringing in new and diversified accounts, this could be the signal for a move on the part of management to stimulate the desire on the part of the sales force to obtain new business. Or when it turns out that it costs at least $6 for a salesman "to turn a doornob" (his salary and expenses divided by number of interviews) and that it may be costing two or three times as much for some men, is it not likely that sales management will begin determining if salesmen are sufficiently guided in their productive efforts?

It is a rule of common sense that a salesman's sales are in proportion to his exposure to prospects, assuming intelligent direction of effort is used in presenting his company's products. The number of calls and the cost of calls must be made apparent to enable the sales management to calibrate the physical effort of a salesman as well as his focusing of his capabilities. Sales managers often say their "sales engineer's" work is such that it cannot be preplanned. Practically always this statement reflects settled habits of thought, for almost anything can be planned. If a salesman's profit is substandard, provided territories are balanced, he is either substandard on the score of capability or physical effort and in need of either direction or incentive.

When the profit analyses show that some territories with high sales volume produce equal or less profit than territories with less sales volume, it might indicate which salesmen are selling (or which areas are markets for) products or jobs that produce the

greatest profit return to the company. If an analysis showing profitability by customer is made and it can be demonstrated that a certain type or class of customer is most profitable, supplementary research on the part of the sales division will almost certainly come into play. Directives to the sales force to go after these new prospects may result.

Other costs may yield a like picture. It may be costing the company a minimum of (say) $2.50 or as high as $6 to handle each order. Many customers' orders will not be sufficiently large to absorb this cost. If this has been true month after month or even year after year, disclosure may startle the sales division into insisting on new outlets or contacts. On another point, warehousing and transportation costs, selling costs to thin markets, the cost for carrying the accounts, etc., may exceed what would be paid in jobber discount to distribute in that way.

The Policy Area

The question of sales policy at once comes up for discussion in connection with all these matters. One of the most important developments from digging for information and establishing a distribution cost accounting system is the degree to which the entire sales and distribution policy may be challenged. In addition, a distribution cost accounting system will begin to stimulate the imagination of the industrial accountant on policy matters. Year after year the manufacturer of bottles sends his men out to sell them. He has warehouses, trucks, etc. Right behind his salesman comes a salesman from the closure manufacturer who makes bottle caps. He also has a warehouse, trucks, etc. The bottle is no good without the cap and vice versa. If some cost accountant in either of these companies began to analyze, he would perhaps begin to think in terms of presenting to management the idea of consolidating sales of noncompetitive products going to the same source.

For years executives in industry have shown instant interest if someone started talking of cost reduction. When comparable attention is given by executives to carrying analysis and preplanning through sales and overhead costs to determine the type of sales they can get most economically, the profits of any company will be substantially increased. Cost accounting for distribution will be a major step in such preplanning.

A POST-SALE RECORD FOR MANUFACTURED EQUIPMENT

by RUSSELL I. JOHNSON,
Tabulating Supervisor, Caterpillar Tractor Co.,
Peoria, Ill.

IT has been observed that "the best way to succeed is to produce an item which could be sold at a profit for five cents, used once, thrown away, and another purchased." The originator of that expression recognized that in the type of product he had in mind, no warranties were involved, no replacements or service were necessary, and all of the benefits of mass production and mass marketing were available. Notwithstanding the soundness of the formula given, durable goods must be produced, distributed, serviced, and, (regrettably) sometimes replaced, and the success or failure of the manufacturer depends largely on the performance of these functions.

Problems of Replacement Parts Business

Although new entrants into mechanical durable goods fields find many customers for their products in times when there is a backlog of demand for such products, the veterans of these fields have learned that in normal times they must be able to keep previously sold machines operating as long as such operations are economical for their owners. Mr. Blackie, Vice President of Caterpillar Tractor Co. in a forum letter published in the December 15, 1947 *N. A. C. A. Bulletin* offers the following definition of "normal times": "A theoretical concept about what would be if unusual things which usually are never were."

To keep old machines operating requires the retention of the tools for manufacturing replacement parts of all models produced, investing large sums of capital in parts producing facilities and parts inventories and the establishment of either company-owned or distributor or dealer facilities throughout the territories in which the products were sold.

Each manufacturer probably knows whether or not his products are of the kind which may require post-sale attention, but the degree of such attention may not be readily determinable. When the new peacetime trends have become clear and true competition is again exerting its forces (i.e., when we quit taking orders and start

selling), we will have to know which territories are not being "worked" and those which have relatively low potentialities.

Machine Ownership Survey

Although there are probably other methods of accomplishing the same purpose, our organization has recently completed a "Machine Ownership Review" which enables the company and its dealers and distributors to have current statistical information on each of the following items:

1. Present owners' names.
2. Types of machines in use.
3. Models of machines in use.
4. Serial numbers of machines in use.
5. Type of industry in which each existing machine is being used.
6. County and state in which each machine is located.
7. Sales division in which each machine is located.
8. Distributor or dealer having jurisdiction over each machine.

For many years a record of all of the above data was manually prepared at the time the products or machines were sold to the first user. The need for a more detailed and up-to-date record, one which would reflect present users and other current conditions permitting more accurate prognostication of the future, arose on many occasions. Shortly after the conclusion of the war it was decided by officials of the company that the record of machine ownership must be brought up to date and thenceforth kept current. The assignment was given to the sales department which called upon the accounting department to assist in the compilation of the information gathered.

Using the old manual record as a starting point, separate listings of machine serial numbers were prepared according to the dealer or distributor who had originally made the sales. At this point the cooperation of the dealer and distributor organization was elicited to check physically, where possible, all of our equipment in their territories for additions to, or deletions from, the lists.

As the corrected and up-to-date lists were returned to the company by the dealers and distributors, the data was manually transcribed to a "Machine Ownership Record" electric accounting machine card (Exhibit 1). Although the manual transcribing of

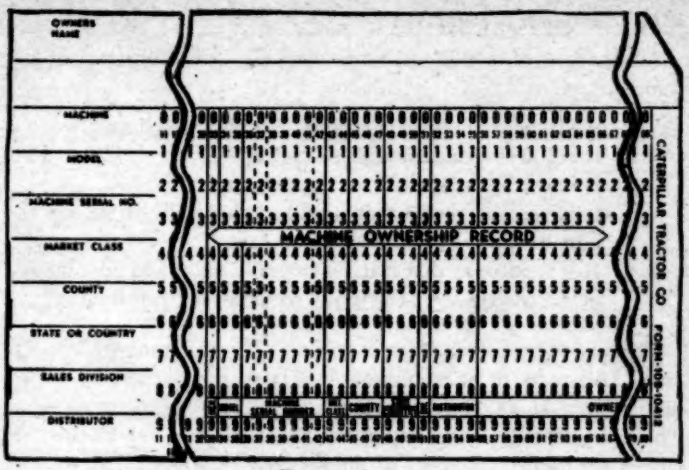

EXHIBIT 1

information from lists to cards appears to be a superfluous operation, it was deemed necessary because the numerous corrections to the original lists would have reduced the speed at which the key punch operators could work.

The cards were then key punched and individual tabulations were prepared listing the machines in the territory of each dealer or distributor. A master model and machine code was used to reduce the product nomenclature to a basis adaptable to electric accounting machines. Each tabulation was then checked against the handwritten information on the cards and the original lists which had been corrected and returned by the distributor or dealer. Any errors which were found were then corrected by repunching and retabulating.

When all clerical errors were eliminated, corrected tabulations were mailed to the respective dealers and distributors in order to secure some serial numbers and market classifications (type of industry of user), and for further rechecking where the original data appeared incorrect. As these tabulations were again returned by the distributors and dealers, the changes appearing thereon were made in the tabulating cards and final tabulations were prepared and checked. Because the machine ownership record maintained at the factory can be utilized for their benefit, distributors and dealers have been extremely cooperative in furnishing the required information.

Why Tabulation Is Employed

Advantages of a punched-card machine ownership record include the following:

1. It provides an efficient method of compiling data.
2. It requires a minimum of storage space.
3. It is readily accessible for maintenance.
4. It is so constructed that it will mechanically write any report within the limitations of its data.
5. It is flexible in that it has practically unlimited possibilities in answering ever-changing requests for information.

The last-named advantage is probably first in rank of importance. Answers to questions of dealers or distributors as to the number and kinds of machines in a territory, the type of work at which the machines are employed, the counties in which the machines are located, the ages of the machines, the potential "repeat" customers, etc., (and etc., etc., etc.,) are readily provided. At the factory, use of the machine ownership record provides answers to such questions as to whom advertising literature should be mailed, where sales campaigns should be concentrated, what replacement parts should be manufactured and stocked, which dealers and distributors need encouragement, etc.

Typical of the tabulations which are prepared from the cards are listings of items in the machine ownership record by: (1) type of machine and model, (2) market classification code number order, (3) county code number order, and (4) machine serial number order, which is tantamount to an aging of the products in the hands of users. All of these groupings display the same column headings and data for each machine, i.e., owner's name, machine class, model class, serial number, market class, county, state, sales division, and distributor number.

Methods of Maintaining Accuracy

A record not kept up to date is not worth keeping. Only a few essential steps are necessary to attain this goal in the maintenance of the machine ownership record:

1. A punched card record is prepared each time a new product is sold. In our opinion, this data is best obtained from a copy of the original sales report furnished by the dealer or distributor.

Sales Records		10/46
Advertising		10/47

"CATERPILLAR" MACHINE OWNERSHIP REPORT

FORM 150-10300

Please make entries on "Caterpillar" Machine Ownership Record as follows:

D-9300 (Model) . POWER UNIT (Machine) . 47-618? (Serial No.)

☐ Former Owner J. E. LAMPORT (Name) . Unknown (Street & No. or R.F.D.)

CHICAGO (City) . COOK (County) . ILLINOIS (State) . SAWMILL (Market Class)

Note: If Former Owner is not known, write "Unknown" in name space above.

☐ Present Owner H. E. KLAMMER (Name) . ROUTE 3 (Street & No. or R.F.D.)

PEORIA (City) . PEORIA (County) . ILLINOIS (State) . SAWMILL (Market Class)

☐ Machine has moved out of our territory. New owner unknown.

We believe it has gone to _____ (State)

in _____ (Distributor) territory.

☐ Machine has been junked

PEORIA TRACTOR & EQUIP. CO. (Reporting Distributor) . PEORIA (City) . ILLINOIS (State)

By _____ Date OCTOBER 24, 1948

IMPORTANT: Mail to Caterpillar Tractor Co., Attention: Sales Records Section, Peoria 8, Illinois.

EXHIBIT 2

2. The existing record is changed whenever a product is traded by the user to a dealer or distributor for a new or different product. Information for the change in the record is obtained from a "Machine Ownership Report" form furnished by the distributor or dealer. (Exhibit 2.)
3. Service reports filed by dealers and distributors should be compared with the machine ownership record to observe any omissions or changes.
4. Periodically, the accuracy of the machine ownership record data should be confirmed by directly corresponding with the owners.

Substitution of Fact for Fancy

To help insure the use of the record for authorized purposes only and to prevent unwarranted duplications of requests for data from the record, our company has insisted that all requests for machine ownership information be routed for approval through one individual in the sales department. The "ownership" or "product" record which has been described in this article is of a certainty no necessity for every business but it, or its counterpart, seems to be an invaluable tool without which a mechanical durable goods manufacturer can only flounder when he attempts to foresee the future. While crystal ball gazing, phrenology, and numerology seem to have been used in forecasting events by some of our economists and by lay individuals, past and present—even in public office—the use of such mystic devices is not recommended for those who wish to continue in business.

COMING — APRIL 15, 1948

A complete case study of small business controls by Clinton W. Bennett

PAYROLL ANALYSIS FOR LABOR COST CONTROL

by GLOYD A. HARLOW,
Manager, Cost and Payroll Department,
Lake Shore Tire & Rubber Co.,
Des Moines, Iowa

IF LABOR COSTS are to be controlled they need constant study and analysis. A periodic payroll analysis, covering both direct and indirect labor and based on a careful study of what the costs should be, can provide the basis for such control. The payroll analysis plan described in this article has several interesting and worth-while features which should prove of interest to all accountants. This plan was developed to meet the need for control information on labor costs by management, department heads, and the cost department in a company engaged in the manufacture of rubber tires. It was developed to provide a check on the effectiveness of labor employed and the cost of extra allowances due to such causes as machine breakdowns and material shortages.

Labor Classifications

The analysis covers both direct and indirect labor of both productive and service departments. In the productive departments the costs are classified as direct labor, indirect labor, night premiums, overtime premiums, and cost-of-living wage allowances. Included in the indirect labor cost of productive departments are payments to direct workers for delay time and special allowances resulting from machine breakdown, lack of material, and failure to earn guaranteed base rates. In the service departments the costs are classified as indirect labor, mechanics labor, night premiums, overtime premiums, and cost-of-living wage allowances, paid to such employees as painters, storekeepers, mechanics, and truck and tractor drivers. Mechanics' labor is a separate expense accumulation of the payroll costs of the plant maintenance crews in the maintenance department.

Report Periods

Our fiscal year consists of thirteen accounting periods of four weeks each. Payroll analyses are prepared weekly and summarized at the end of each four-weeks period. Separate weekly labor

WEEKLY LABOR ANALYSIS

Department: TIRE BUILDING—PASSENGER — No. 8

Period 13 F. Y. 46-47

Activity per cent	100%	104%	93%	101%	95%		
Operation No. and description	Weekly Budget	WEEKS ENDED 11-9	11-16	11-23	11-30	Period total Actual	Variance
1 Stock builders	P $ 995	$1,015.16	$ 994.73	$1,001.14	$ 993.41	$ 4,004.44	$— 13
	D	530.14	491.16	521.94	495.16	2,038.40	+ 25
2 Cement tread ends	P 515	3,014.93	2,814.16	3,210.18	3,154.17	12,193.44	
	D	518.16	483.94	264.91		1,267.01	—584
3 Build tires	P 3,316	719.56	641.18	689.13	653.24	2,703.11	+ 53
	D						
4 Service builders	P 681	313.73	331.54	359.47	338.22	1,342.96	— 75
	D	115.10				115.10	
5 Crimp treads	P 355	262.18	243.43	230.10	236.18	971.89	—100
	D			81.15	40.13	121.28	
6 Cut chafers	P 254						
	D						
Total direct labor	P 6,116	4,840.54	4,521.47	5,010.82	4,876.97	19,249.80	
	D	1,648.42	1,478.67	1,347.20	1,033.54	5,507.83	—694
21 Make-up time	153	116.13	163.14	125.23	162.18	566.68	+ 45
22 Learning time	114	121.33	93.16	95.26	123.92	433.67	+ 31
23 Waiting time	25	10.16	5.14	41.24	59.83	116.37	— 24
24 Breakdown time	56	111.73	24.18	43.18	57.81	236.90	— 15
25 Showup time	5	-0-	3.33	-0-	2.84	6.17	+ 14
26 Experimental	110	109.84	125.16	110.18	94.32	439.50	— 3
27 Repairing and reworking	254	250.18	251.93	250.28	249.83	1,002.22	— 33
28 Cleaning equipment	145	150.16	143.73	153.89	143.18	590.96	— 23
29 Method excess	25	-0-	28.13	25.73	38.41	92.27	+ 8
30 Liner reroller	110	110.16	110.17	111.23	109.83	441.39	— 3
31 Remove tread trim	54	54.00	54.00	54.00	54.00	216.00	— 2
66 Cost of living wage allow	810	821.73	800.43	825.13	773.81	3,221.10	+ 23
52 Overtime premium	56	65.43	51.13	57.43	52.31	226.30	+ 3
61 Night premium	70	62.52	73.32	75.16	68.43	279.43	+ 2
Total indirect labor	1,051	1,033.69	1,002.07	1,010.22	1,096.15	4,142.13	— 5
Total direct labor	6,116	6,488.96	6,000.14	6,358.02	5,910.51	24,757.63	—694
Total payroll	8,103	8,472.33	7,927.09	8,325.96	7,901.21	32,626.59	—671

EXHIBIT 1.

analyses are prepared for each department (Exhibit 1) by labor operations and expense classifications and the totals by departments are summarized on a report covering all departments. Each report provides space for the figures for four weeks and for reporting the totals and variances for the four-weeks period.

Labor cost control is aided by a sound job classification plan with equitably related occupation rates, based on a fair evaluation of each labor operation, and by keeping all possible operations which are directly related to production on an incentive basis. In our case a piece-rate system is used. For cost control, management needs to know where and why hourly rated earnings are being paid where piece-rate earnings should apply. Our labor analysis report provides the breakdown for all direct labor operations, "P" signifying piece rate and "D" indicating day work. Production department foremen and the industrial engineering department are required to furnish reasons for day work on those operations where piece rates should apply.

Relating Costs to the Activity Level

Providing a department supervisor with a weekly report of labor costs by operations and expense accounts will give him some help in labor cost control. But unless he knows what his labor costs should be for the activity level at which he operates, he has no way of knowing whether or not his costs are in line. We meet this need by providing a weekly forecast budget for each labor operation in the department. Our forecast budgets are revised quarterly, and the weekly amounts developed for a normal or 100 per cent activity level. This 100 per cent budget is shown in the first money column of the labor analysis report. (Exhibit 1.)

In addition to the actual expenditures for the week each report shows at the top of the column the level of activity for the week. This departmental activity rate is based on the same measure of activity as is used in developing the budget, i.e., standard labor hours, standard labor dollars, units, pounds produced, etc. If departmental activity for the week is at the forecast or 100 per cent level, the budgeted and actual amounts are directly comparable. If production is above or below the 100 per cent rate, the budgeted allowances can be extended at the actual rate of activity to provide the standard allowance at that activity level.

PAYROLL SUMMARIZED BY EXPENSE CLASSIFICATION

Period Thirteen—Ended 11/30/47

Account number	Item	Current period		Cumulative year to date	
		Actual	Variance from standard +Favorable —Unfavorable	Actual	Variance from standard +Favorable —Unfavorable
		$	$	$	$
10	Direct labor...	215,113.14	+3,809.93	1,986,314.63	+14,813.84
223	Indirect labor.	16,318.14	—199.13	165,274.49	—47.99
243-52	Overtime premium	2,048.63	—53.18	48,363.18	+1,014.16
243-61	Night premium	5,433.16	+54.29	75,813.73	+984.16
243-66	Cost of living wage allowance	16,894.33	—169.53	164,894.13	—5,842.92
249	Mechanics labor	10,594.61	+89.33	136,548.16	+4,893.16
500	Warehousing and shipping.	2,083.17	+35.13	26,947.31	—269.73
	Total payroll	268,485.18	+3,566.74	2,604,155.63	+15,544.68

EXHIBIT 2.

By comparing the actual expenditures with the standard allowances for the level of activity experienced, a foreman can readily determine whether or not his labor costs are running in line with the production level of his department. To guide the department foreman in effective use of the weekly payroll analysis report, we issue a budget guide book (which he has helped to prepare) in which weekly budget dollars are converted into numbers of men (called a manpower budget) and man hours per week.

One factor in our plant which aids in the fast preparation of these reports is that inventories of productive departments are maintained at constant levels from period to period. This permits us to charge all direct labor and burden to production and eliminates the necessity of evaluating labor in process.

Review Meetings

At a weekly meeting conducted by production management the reports for each department are reviewed. Where unfavorable results are shown for an operation, explanations are obtained to determine whether or not the excess spending was justified. If not justified corrective measures to bring the cost in line in subsequent weeks are decided upon. The weekly discussion meetings provide suggestions and recommendations on which the in-

dustrial engineering and personnel departments, as well as the departmental foremen, can act to control and reduce labor costs. Notes and comments collected at these discussions are valuable in connection with subsequent revisions of the forecast budgets.

The variances arrived at for each week merely provide guidance by indicating approximate results, although the approximations are remarkably close. While the labor analysis report does not show the variance figures weekly, it does provide actuals for each week and for the four-week period, and the total variance for the period to the nearest dollar. These variances represent the actual gains and losses as shown in the profit and loss statement.

The complete payroll analysis for an accounting period, in addition to its use for cost control, becomes the basis for the periodic journal entries, giving the distribution of the total payroll by general ledger expense classifications. This is illustrated in Exhibit 2.

Preparation of Reports

The preparation of the payroll analysis report requires the cooperation of various departments. Briefly, the responsibilities in connection with its preparation are as follows:

1. The cost department is responsible for developing the weekly budget figures, and it originates the analysis at the beginning of each accounting period.
2. The planning and scheduling department, which is responsible for departmental production reports, furnishes production figures to the cost department where they are related to weekly forecast budgets and activity per cents are calculated.
3. The payroll department accumulates weekly labor total by operations and by departments, broken down as required on the analysis report, posts to the report each week, and accumulates a total for each accounting period.
4. While the payroll department is completing labor distribution for the last week of the accounting period and has totaled the reports, the cost department develops standard dollars earned, based on production for the period. The cost department now completes the report for the period. They record the variances on the report as developed for each item by comparing standard earned with total actual

for the period. Unfavorable variances indicated by a minus sign indicate underabsorbed expense for the period, while others reveal savings or favorable results.

Prompt Issuance Increases Usefulness

This detailed analysis for a four-week period can be issued for the week following the period to which it applies, and does not have to wait for completion of factory cost statements which usually require more detail in development and cannot be issued for another week or ten days. Thus, without waiting for the factory cost statements, all payroll labor has been analyzed in detail and submitted to responsible personnel in a very short time following the close of the accounting period. The foreman of a department registers satisfaction when he can see the results of his efforts in dollars, and see the part he played in the operation of a unit or department of his company. Management can see the departments where results indicate something is out of line and can quickly take steps to correct the situation. An interesting summary developed for management furnishes periodic results on common operations for all *indirect* labor payroll (Exhibit 3). This report

SUMMARY OF COMMON OPERATIONS FOR ALL DEPARTMENTS

INDIRECT LABOR

Period Thirteen—Ended 11/30/47

Code	Operations	Current period		Cumulative year to date	
		Actual	Variance from standard +Favorable —Unfavorable	Actual	Variance from standard +Favorable —Unfavorable
		$	$	$	$
21	Make-up time	1,942	—527	15,484	+475
22	Learning time	1,213	+23	10,943	—176
23	Waiting time	1,044	—264	10,894	+1,002
24	Breakdown time	956	+47	8,351	—255
25	Show-up time	45	+3	700	—54
26	Experimental	1,516	—89	21,835	—134
27	Repair and rework	2,583	+376	15,835	+596
28	Cleaning equipment	893	+98	5,143	+250
29	Method excess	477	—305	2,894	—189
	All others specific to one department	5,649	+439	73,195	—1,563
	Total	16,318	—199	165,274	—48

EXHIBIT 3.

brings out the periodic results on allowances and expenses which are common in all departments.

Method of Preparation

Several methods for publishing these reports can be used. Where several copies are needed, a duplicating process provides the best results. The direct liquid duplicating process is used in our preparation of the report where several copies can be obtained from a master sheet. We use a preprinted master form for productive departments and another form for nonproductive departments and summaries. In originating the report at the start of a period, headings, operation numbers and descriptions, week-ending dates, and weekly budget dollars are typed on the master sheet for each department and each summary. The master sheets now are ready for manual recording of weekly labor totals by the payroll department. Soon after the first week's totals and activity factors are posted in detail to the master sheets, the required number of copies are run off for distribution, usually two to three days following the week-ended date.

The same master sheets are used for the entire accounting period. The labor detail and activity factors are manually posted to the master sheets for the second week and copies as required are run off for distribution. This is again repeated following the third and fourth week while following the fourth week total and variances are added before running the final and complete reports for the accounting period.

Conclusion

In conclusion, it has been observed that management in our plant has found the data, the analysis, and the information which this method has provided covering payroll expenditures very useful in controlling labor costs. Foremen of departments have taken action as a result of data reflected, resulting in immediate cost reductions. The data presented to department heads have given them much encouragement as successful managers because it has furnished results in dollars gained or lost in their efforts to operate a department on a paying basis as far as labor cost is concerned. The figures developed through this analysis have been of great aid in establishing budgets and standards, which in turn have been reflected in competitive unit product prices.